NASA SBIR/STTR Technologies

A NOVEL MICROFLUIDIC DEVICE (MED-RNA) FOR FULLY AUTOMATED EXTRACTION OF RNA FROM CELLS

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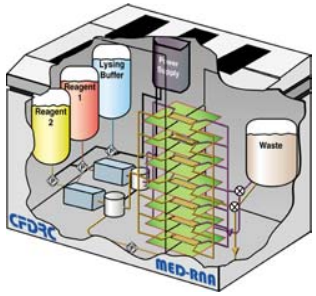
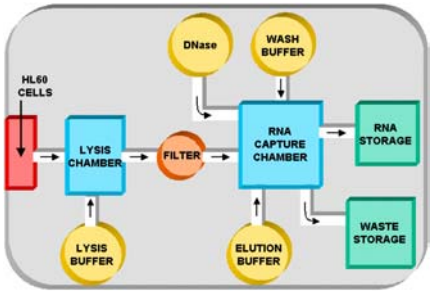
Objective:

Develop a Microfluidics-based, Extraction Device (MED-RNA) for RNA isolation from cells. Starting from whole cells in a culture medium, the plastic card will lyse, filter, capture, elute and store RNA for later analysis. Loss & Contamination are reduced due to minimal handling.

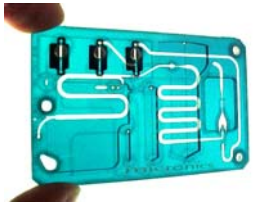




- Parallel architecture with ~10 credit card size, disposable, plastic lab-cards
- Microfluidic design eliminates expensive automation, liquid handling components
- Main components of each card include
  - » E-field lysis chamber (minimal toxic reagents)
  - » RNA capture chamber (non-magnetic beads)
  - » RNA & Waste storage chambers (sealed)

Partners:

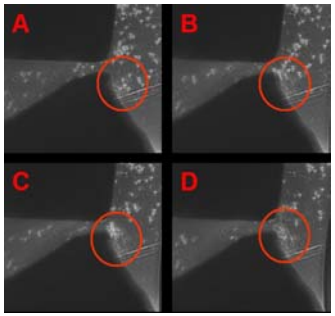
Micronics Corp. WA



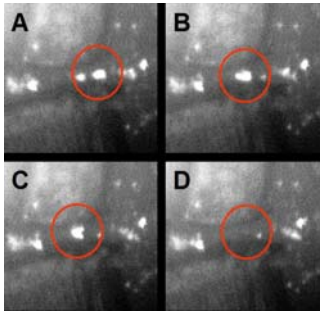
Throughput (cells)	1000-5000
Extraction Time	<15 min
Reagent Volume	~1 ml (up to 5)
RNA Yield	0.5-2.5 µg
Device Footprint	12″×12″×6″
Weight	<10 lbs

Phase I Results:

E-field Lysis (HL-60)

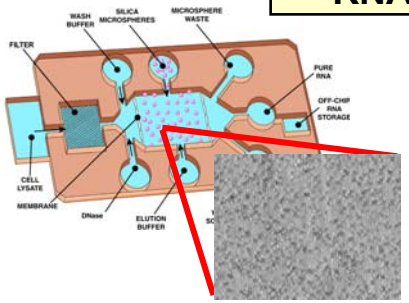


Brightfield



Fluorescence

RNA Extraction



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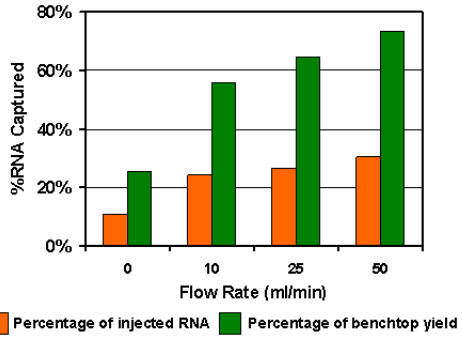

Summary:

- Phase I: Conceptually designed and demonstrated
  - » Electric Field Driven Lysis of HL60 cells
  - » Microfluidic RNA Capture on Beads (non-magnetic)
- Proposed Phase II Workscope
  - » Component Design & Integration on Microfluidic Card
  - » Instrument Design & Testing